

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

HONEYWELL INTERNATIONAL INC. and )  
HONEYWELL INTELLECTUAL PROPERTIES INC., )  
v. )  
Plaintiffs, ) C.A. No. 04-1338-\*\*\*  
v. ) (Consolidated)  
APPLE COMPUTER, INC., et al., )  
Defendants. )

**NOTICE OF SUBPOENA DIRECTED TO THE HOSIDEN AMERICA CORPORATION**

PLEASE TAKE NOTICE that, pursuant to Rules 26 and 45 of the Federal Rules of Civil Procedure, Defendant FUJIFILM Corporation (“Fuji”) is serving a subpoena on Hosiden America Corporation, Schaumberg, Illinois, (“Hosiden America”) in the form appended hereto. Hosiden America is commanded to produce, on October 29, 2007, the documents described in “Attachment A” to the subpoena.

OF COUNSEL:

Lawrence Rosenthal  
Matthew W. Siegal  
Ian G. DiBernardo  
Angie M. Hankins  
Kevin C. Ecker  
STROOCK & STROOCK & LAVAN LLP  
180 Maiden Lane  
New York, NY 10038-4982  
(212) 806-5400

POTTER ANDERSON & CORROON LLP

By:



Philip A. Rovner (#3215)  
Hercules Plaza  
P.O. Box 951  
Wilmington, DE 19899  
(302) 984-6000  
provner@potteranderson.com

Date: October 1, 2007  
822393

Attorneys for Defendant  
FUJIFILM Corporation

**UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ILLINOIS**

HONEYWELL INTERNATIONAL INC. and  
HONEYWELL INTELLECTUAL PROPERTIES,  
INC.

Plaintiffs,  
- v. -  
APPLE COMPUTER, INC., et al.,  
Defendants.

**SUBPOENA IN A CIVIL CASE**

PENDING IN THE U.S. DISTRICT COURT FOR  
THE DISTRICT OF DELAWARE

CASE NUMBER: 04-1338 (\*\*\*)  
(Consolidated)

To: Hosiden America Corporation  
120 East State Parkway  
Schaumburg, Illinois 60173

YOU ARE COMMANDED to appear in the United States District Court at the place, date, and time specified below to testify in the above case.

PLACE OF TESTIMONY	COURTROOM
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YOU ARE COMMANDED to appear at the place, date, and time specified below to testify at the taking of a deposition in the above case.

PLACE OF TESTIMONY	DATE AND TIME
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YOU ARE COMMANDED to produce a witness having personal knowledge of the matters set forth in Attachment B of the attached Notice of Deposition to appear at the place, date and time specified below to testify at the taking of a deposition in the above case.

PLACE: TO BE DETERMINED	DATE AND TIME
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YOU ARE COMMANDED to produce and permit inspection and copying of the documents or objects listed in Attachment A attached hereto, at the place, date, and time specified below.

PLACE: Stroock & Stroock & Lavan LLP, 180 Maiden Lane, New York, NY 10038	DATE AND TIME October 29, 2007
--	-----------------------------------

YOU ARE COMMANDED to permit inspection of the following premises at the date and time specified below.

PREMISES:	DATE AND TIME
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Any organization not a party to this proceeding case that is subpoenaed for the taking of a deposition shall designate one or more officers, directors or managing agents, or other persons who consent to testify on its behalf, and may set forth, for each person designated, the matters on which the person will testify, Fed.R.Civ.P. 30(b)(6).

ISSUING OFFICER SIGNATURE AND TITLE  Attorney for Defendant FUJIFILM Corporation	DATE September 28, 2007
---	----------------------------

ISSUING OFFICER'S NAME, ADDRESS AND PHONE NUMBER Ian G. DiBernardo, Stroock & Stroock & Lavan LLP, 180 Maiden Lane, New York, NY 10038-4982 (212) 806-5400
---

PROOF OF SERVICE		
SERVED	DATE	PLACE
SERVED ON (PRINT NAME)		MANNER OF SERVICE
SERVED BY (PRINT NAME)		TITLE

**DECLARATION OF SERVER**

I declare under penalty of perjury under the laws of the United States of America that the foregoing information contained in the Proof of Service is true and correct.

Executed on \_\_\_\_\_  
 DATE \_\_\_\_\_  
 SIGNATURE OF SERVER \_\_\_\_\_  
 ADDRESS OF SERVER \_\_\_\_\_

**Rule 45, Fed.R.Civ.P., Parts (C) & (D)****(c) PROTECTION OF PERSONS SUBJECT TO SUBPOENAS.**

(1) A party or an attorney responsible for the issuance and service of a subpoena shall take reasonable steps to avoid imposing undue burden or expense on a person subject to that subpoena. The court on behalf of which the subpoena was issued shall enforce this duty and sanction, which may include, but is not limited to, lost earnings and a reasonable attorney's fee.

(2)(A) A person commanded to produce and permit inspection and copying of designated books, papers, documents or tangible things or inspection of premises need not appear in person at the place of production or inspection unless commanded to appear for deposition, hearing or trial.

(B) Subject to paragraph (d)(2) of this rule, a person commanded to produce and permit inspection and copying may, within 14 days after service of the subpoena or before the time specified for compliance if such time is less than 14 days after service, serve upon the party or attorney designated in the subpoena written objection to inspection or copying of any or all of the designated materials or of the premises. If objection is made, the party serving the subpoena shall not be entitled to inspect and copy the materials or inspect this premises except pursuant to an order of the court by which the subpoena was issued. If objection has been made, the party serving the subpoena may, upon notice is to the person commanded to produce, move at any time for an order to compel the production. Such an order to compel production shall protect any person who is not a party or an officer of a party from significant expense resulting from the inspection and copying commanded.

(3)(A) On timely motion, the court by which a subpoena was issued shall quash or modify the subpoena if it

- (i) fails to allow reasonable time for compliance;
- (ii) requires a person who is not a party or an officer of a party to travel to a place more than 100 miles from the place where that person resides, is employed and or regularly transacts business

in person, except that, subject to the provisions of clause (c)(3)(B)(iii) of this rule, such a person may in order to attend trial be commanded to travel from any such place within the state in which the trial is held, or

(iii) requires disclosure of privileged or other protected matter and no exception or waiver applied, or

(iv) subject a person to undue burden.

**(B) If a subpoena**

(i) require disclosure of a trade secret or other confidential research, development, or commercial information, or

(ii) requires disclosure of an unretained expert's opinion or information not describing specific events or occurrences in dispute and resulting from the expert's study made not at the request of any party, or

(iii) requires a person who is not a party or an officer of a party to incur substantial expense to travel more than 100 miles to attend trial, the court may, to protect a person subject to or affected by the subpoena, quash or modify the subpoena or, if the party in whose behalf the subpoena is issued shows a substantial need for the testimony or material that cannot be otherwise met without undue hardship and assures that the person to whom the subpoena is addressed will be reasonably compensated, the court may order appearance or production only upon specified conditions.

**(d) DUTIES IN RESPONDING TO SUBPOENA**

(1) A person responding to a subpoena to produce documents shall produce them as they are kept in the usual course of business or shall organize and label them to correspond with the categories in the demand.

(2) When information subject to a subpoena is withheld on a claim that it is privileged or subject to protection as trial preparation materials, the claim shall be made expressly and shall be supported by a description of the nature of the documents, communications, or things not produced that is sufficient to enable the demanding party to contest the claim.

**ATTACHMENT A**

**DEFINITIONS**

As used in this Subpoena the terms listed below are defined as follows:

1. “371 patent” shall mean United States Letters Patent No. 5,280,371 entitled “Directional Diffuser for a Liquid Crystal Display,” (copy attached) and the application therefor, and all parent applications, continuation, continuation-in-part, divisionals and other related applications, all reexaminations and reissues, and the patent family thereof.
2. “3M” shall mean the 3M Company and all of its divisions, departments, subsidiaries (whether direct or indirect), parents, affiliates, acquisitions, predecessors and entities controlled by any of them, whether domestic or foreign, and their respective present or former officers, directors, employees, owners, attorneys and agents, as well as consultants and any other persons acting or purporting to act on behalf of each such entity or person.
3. The words “and”, “and/or”, and “or” shall each be deemed to refer to both their conjunctive and disjunctive meanings. The words “all” and “any” shall mean “each and every” as well as “any one”. The masculine gender shall be deemed to include the feminine and the neuter where appropriate, the singular, the plural, and vice versa. The terms “person” or “persons” mean any natural person, corporation, partnership, association, organization, or group of natural persons, including but not limited to any employee, officer, director, consultant, independent contractor, agent, attorney or representative of any of them.
4. “Contract” shall mean all contracts, agreements, instruments, conditional sales contracts, letters of intent, memoranda of understanding, licenses, commitments or other

arrangements, and any other documents setting forth terms or conditions, or otherwise governing the relationship between parties, together with all modifications and amendments thereto.

5. The words "document" or "documents" shall be used in their broadest sense and shall include, but are not limited to, any tangible thing capable of storing information, including but not limited to the following items, whether printed, typed or recorded or reproduced by hand or electronically, magnetically, optically or in any graphic manner of any kind or nature however produced or reproduced, whether sent or received or neither, whether within the actual or constructive possession, custody, or control of any agent, employee, consultant, or any other person acting or purporting to act on behalf of you or Hosiden, including drafts and copies bearing notations or marks not found on the original, and includes, but is not limited to:

- a. all letters or other forms of correspondence or communication, including envelopes, notes, telefaxes, telegrams, cables, electronic mail messages, telex messages, and telephone messages (including reports, notes, notations and memoranda of or relating to any telephone conversations or conferences or personal interviews);
- b. all memoranda, laboratory notebooks, research reports, speeches, reports, financial statements or reports, appraisals, estimates, sales proposals, RFQ or RFP responses, notes, transcripts, tabulations, ledgers, studies, analyses, evaluations, projections, work papers of any type, corporate records or copies thereof, lists, comparisons, questionnaires, surveys, charts, graphs, maps, diagrams, summaries, tables, indexes, extracts, statistical records, compilations, reports and/or summaries of investigations, testing or analyses, marginal notations, all desk calendars, appointment books and diaries;
- c. all books, manuscripts (whether submitted for publication or not), press releases, magazines, newspapers, booklets, brochures, sales support materials, training materials, pamphlets, circulars, bulletins, notices, speeches, instructions, manuals, and articles;
- d. all minutes, transcripts, notes, presentation material, and memoranda of meetings;
- e. all photographs, drawings, microfilms, tapes or other recordings, punch cards, magnetic tapes, magnetic disks, optical or magneto-optical disks, print-outs, and other data compilations from which information can be obtained, and any other information recorded in or on any medium whatsoever; and

f. all contracts, agreements, understandings, letters of intent, proposals, memoranda of understanding, representations and warranties.

6. The term "Honeywell" shall refer to Honeywell International, Inc. and Honeywell Intellectual Properties Inc., and all divisions, departments, subsidiaries (whether direct or indirect), parents, affiliates, acquisitions, predecessors and entities controlled by any of them, whether domestic or foreign, including but not limited to, Honeywell Inc., and their respective present or former officers, directors, employees, owners, attorneys and agents, as well as consultants and any other persons acting or purporting to act on behalf of each such entity or person.

7. "Hosiden" refers to Hosiden Corporation and all of its divisions, business units, departments, subsidiaries (whether direct or indirect), parents, affiliates, divisions, business units, subsidiaries, acquisitions, predecessors and entities controlled by any of them, whether domestic or foreign, including but not limited to Hosiden America Corporation, and their respective present or former officers, directors, employees, owners, attorneys and agents, as well as consultants and any other persons acting or purporting to act on behalf of each such entity or person.

8. "JAE" shall mean Japan Aviation Electronics and all of its divisions, departments, subsidiaries (whether direct or indirect), parents, affiliates, acquisitions, predecessors and entities controlled by any of them, whether domestic or foreign, and their respective present or former officers, directors, employees, owners, attorneys and agents, as well as consultants and any other persons acting or purporting to act on behalf of each such entity or person.

9. "LCD Module" shall mean a liquid crystal display for incorporation into another product or any assembly for use in a liquid crystal display, including but not limited to, a backlight and liquid crystal panel.

10. The terms "person" or "persons" mean any natural person, corporation, partnership, association, organization, or group of natural persons, including but not limited to any employee, officer, director, consultant, independent contractor, agent, attorney or representative of any of them.

11. Unless otherwise specified herein, "relates to" and "refers to", and forms thereof, shall be used interchangeably to mean concerning, comprising, involving, directed to, created by, sent to, received by, copied to, responsible for, or in any way logically or factually connected to the subject of the request.

12. "SID" shall mean the Society for Information Display.

13. The terms "thing" and "things" refer to any material object, such as samples, prototypes, packaging samples, models, illustrations of physical and chemical phenomena, and photographs, montages, movies or videotapes of physical objects, and electronic representations of any of the above.

14. The terms "you" or "your" refer to Hosiden America Corporation and all of its divisions, business units, departments, subsidiaries (whether direct or indirect), affiliates, divisions, subsidiaries, acquisitions, predecessors and entities controlled by any of them, whether domestic or foreign, and their respective present or former officers, directors, employees,

owners, attorneys and agents, as well as consultants and any other persons acting or purporting to act on behalf of each such entity or person.

**INSTRUCTIONS**

1. These requests shall apply to all documents and things in your possession, custody or control at the present time or coming into your possession, custody or control, including, but not limited to, documents and things in Hosiden's possession, custody or control. If you know of the existence, past or present, of any document or thing requested below, but are unable to produce such document or thing because it is not presently in your possession, custody, or control, you shall so state and shall identify such document or thing, and the person who now has or lost his possession, custody or control of the document or thing.
2. All documents that respond, in whole or in part, to any request are to be produced in their entirety, without abbreviation or expurgation, including all attachments or other matters affixed thereto.
3. If no documents are responsive to a particular request, you are to state that no responsive documents exist.
4. All documents shall be produced either in order of Request or in the manner that they are kept in the usual course of business. Whenever a document or group of documents is removed from a file folder, binder, file drawer, file box, notebook, or other cover or container, a copy of the label or other means of identification of such cover or other container shall be attached to the document.
5. If any document requested has existed, but has been lost, destroyed, or is no longer within your possession, custody or control, identify those documents and describe the

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document, its author(s), the recipients(s) or addressee(s), the subject matter and content. Further, if the document has been destroyed, state with particularity the date and circumstances surrounding the reasons for its destruction, and identify the last known custodian of the document and each person who has knowledge of the contents, loss or destruction of any such document.

6. In the event that any document identified in these Requests is subject to any claim of privilege (including work product), you shall furnish a list identifying each such document by:

- a. identifying the person who prepared or authored the document and, if applicable, the persons who sent the document or thing and to whom the document (including copies) or thing was sent and the dates on which the document or thing was prepared and transmitted, identifying persons who prepared, sent and/or received the document or thing as required in the accompanying Definitions;
- b. describing the nature of the document or thing (e.g., letter, inter-office memorandum, telegram, notes, etc.) and, to the extent possible, the subject matter thereof;
- c. identifying any and all attachments or enclosures appurtenant to such documents;
- d. stating briefly the nature of the privilege asserted; and
- e. producing any non-privileged portions, attachments or enclosures to any such privileged document, and identifying the portion(s) of the document to which privilege is claimed.

7. If, subsequent to the date you produce documents responsive to these requests you discover or receive documents that are responsive to any request herein, promptly produce all such additional documents to the full extent required by the Federal Rules of Civil Procedure and the Local Rules of the District Court.

8. Each document is to be produced along with all drafts and copies having annotations different from those on other copies, without abbreviation or redaction.

9. In the event any document identified in these Requests is deemed confidential by you or Hosiden, it shall be produced in accordance with the annexed Stipulated Protective Order in this case and the confidentiality thereof will be provided the protection of the Order pursuant to paragraph 20 thereof.

**DOCUMENTS AND THINGS TO BE PRODUCED**

1. All documents relating or referring to the design, development, testing, manufacturing, marketing, sale, purchase or supply of liquid crystal displays, LCD Modules or components thereof, whether final products or prototypes, by, for or on behalf of Honeywell, including, but not limited to, all documents provided by or on behalf of Honeywell, The Boeing Company or JAE to Hosiden and all documents provided by or on behalf of Hosiden to Honeywell, The Boeing Company or JAE relating or referring to liquid crystal displays, LCD Modules or components thereof between January 1, 1988 and December 31, 1994.

2. All proposals, requirements, documents, specifications, requests for quotations and requests for proposals, and all responses thereto, from Honeywell to Hosiden, or vice versa, relating or referring to liquid crystal displays, LCD Modules or components thereof issued or outstanding between January 1, 1988 and December 31, 1994, and all documents relating or referring thereto.

3. All Contracts relating or referring to Hosiden's relationship with Honeywell at any time between January 1, 1988 and January 18, 1994, including, but not limited to, all Contracts relating or referring to licenses of technology, know-how, intellectual property (including patents and patent applications) and/or inventions and/or to nondisclosure or

confidence obligations between Hosiden and Honeywell in force at any time between January 1, 1988 and January 18, 1994.

4. All products, samples, prototypes, models, and demonstrations provided to or by Honeywell between January 1, 1988 and December 31, 1994 related to avionic displays, liquid crystal displays, LCD Modules or components thereof, including, but not limited to, those referred to by Honeywell as Display Units, numbers 8, 9 and 10 (DU #8, 9 and 10), and all documents relating or referring thereto.

5. All products, samples, prototypes, models and demonstrations of avionic displays, liquid crystal displays, LCD Modules or components thereof furnished by Hosiden to another person on behalf of Honeywell, including but not limited to, Honeywell itself, the Boeing Company and JAE, or provided to Hosiden by or on behalf of Honeywell between January 1, 1988 and December 31, 1994, and all documents relating or referring thereto.

6. All documents relating or referring to work done for The Boeing Company, whether performed directly or indirectly through Honeywell and/or JAE including, but not limited to, all documents relating to liquid crystal displays, LCD Modules or components thereof, for use in the Boeing 777, 767, 7J7, and 767X airplanes.

7. All documents, including but not limited to, agendas, meeting minutes and meeting notes, relating or referring to meetings of Honeywell, JAE and/or The Boeing Company, whether or not attended by Hosiden, relating to liquid crystal displays, LCD modules or components thereof.

8. All documents relating or referring to Hosiden's interaction, collaboration, supplying of materials or services to or other relationship with any person, including but not limited to JAE, on behalf of or in connection with providing materials or services to Honeywell.

9. Organizational charts or other documents for any division, group or department of Hosiden that worked or collaborated with Honeywell or any of the inventors of the '371 patent and/or to which Honeywell provided information or designs between January 1, 1988 and January 18, 1994, from which the identification of the employees or consultants of Hosiden who actively participated with Honeywell in connection with the design, development, testing, manufacture, marketing, sale, purchase or supply of liquid crystal displays, LCD Modules or components thereof can be made.

10. All documents relating or referring to the '371 patent or the subject matter thereof and Hosiden's interest in acquiring, and Honeywell's offering of, rights under the '371 patent, including but not limited to, all communications between Hosiden and Honeywell regarding the '371 patent (including but not limited to Hosiden letter HDO050, dated August 7, 1992 and correspondence to or from Mr. Yasohiro Ugai of Hosiden), valuations of the '371 patent and prior art to the '371 patent.

11. All communications between Hosiden and any of the inventors of the '371 patent namely, Richard I. McCartney, Jr., Daniel D. Syroid, and Karen E. Jachimowicz.

12. All documents referring or relating to the existence, reduction or avoidance of moiré interference, use of one or more lenticular, prismatic or other lens arrays (including, but not limited to, Optical Lighting Film (OLF) or Brightness Enhancing Film (BEF) offered by 3M or similar product) in an LCD Module or backlight for a liquid crystal display on or before

December 31, 1998, or rotation of a periodic structure to avoid or reduce moiré interference on or before December 31, 1998.

13. All documents referring or relating to meetings, conferences, papers or publications of the SID between January 1988 and October 2004.

14. All documents relating or referring to the existence, non-existence or destruction, including the timing of any such destruction, of any document or thing responsive to these Requests, including but not limited to, Hosiden document retention and document destruction policies in effect from January 1994.



US005280371A

**United States Patent [19]**  
**McCartney, Jr. et al.**

[11] Patent Number: **5,280,371**  
[45] Date of Patent: **Jan. 18, 1994**

## [54] DIRECTIONAL DIFFUSER FOR A LIQUID CRYSTAL DISPLAY

[75] Inventors: Richard I. McCartney, Jr.,  
Scottsdale; Daniel D. Syroid,  
Glendale; Karen E. Jachimowicz,  
Goodyear, all of Ariz.

[73] Assignee: Honeywell Inc., Minneapolis, Minn.

[21] Appl. No.: 911,547

[22] Filed: Jul. 9, 1992

[51] Int. Cl.<sup>5</sup> ..... G02F 1/133  
[52] U.S. Cl. ..... 359/40; 359/69  
[58] Field of Search ..... 359/69, 40, 41

## [56] References Cited

## U.S. PATENT DOCUMENTS

4,416,515 11/1983 Fumada et al. ..... 359/69  
5,052,783 10/1991 Hamada ..... 359/41  
5,101,279 3/1992 Kurematsu et al. ..... 359/40  
5,128,783 7/1992 Abileah et al. ..... 359/40  
5,161,041 11/1992 Abileah et al. ..... 359/40

## FOREIGN PATENT DOCUMENTS

0068400 10/1977 Japan ..... 359/69  
2-14822 8/1990 Japan ..... 359/69

## OTHER PUBLICATIONS

IBM Corp., "Polarized backlight for liquid crystal display", IBM Technical Disclosure Bulletin, vol. 33, No. 1B, Jun. 1990, pp. 143-144.

*Primary Examiner*—William L. Sikes

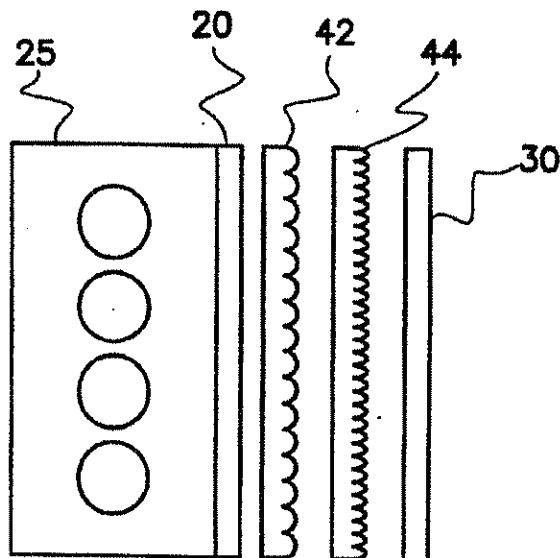
*Assistant Examiner*—Huy Mai

*Attorney, Agent, or Firm*—Dale E. Jepsen; A. Medved

## [57] ABSTRACT

A display apparatus including a light source, a liquid crystal panel, and one or more directional diffuser lens arrays disposed therebetween provides a tailored variation of luminance with viewing angle, a uniform variation of luminance with viewing angle within a first predetermined range of viewing angles and a concentration of light energy within a second predetermined range of viewing angles.

3 Claims, 11 Drawing Sheets



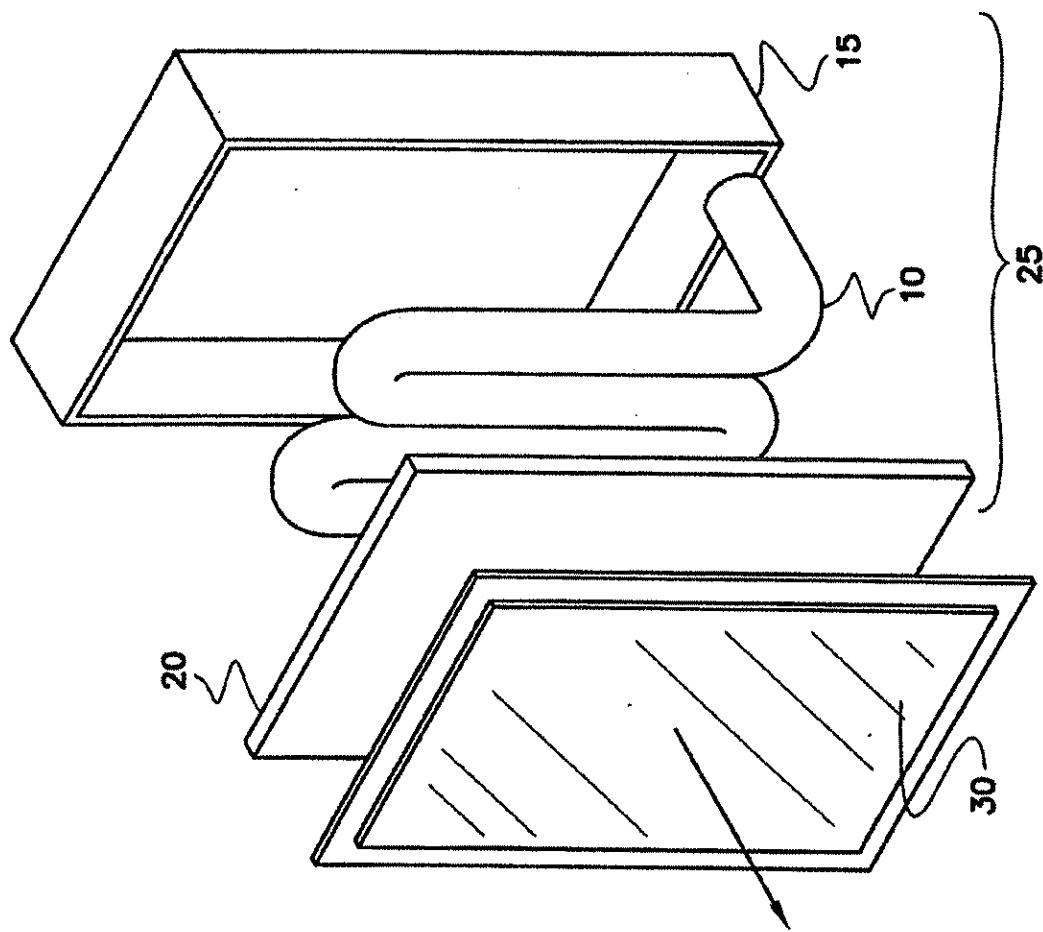
**U.S. Patent**

Jan. 18, 1994

Sheet 1 of 11

**5,280,371**

*Fig. 1*  
**PRIOR ART**



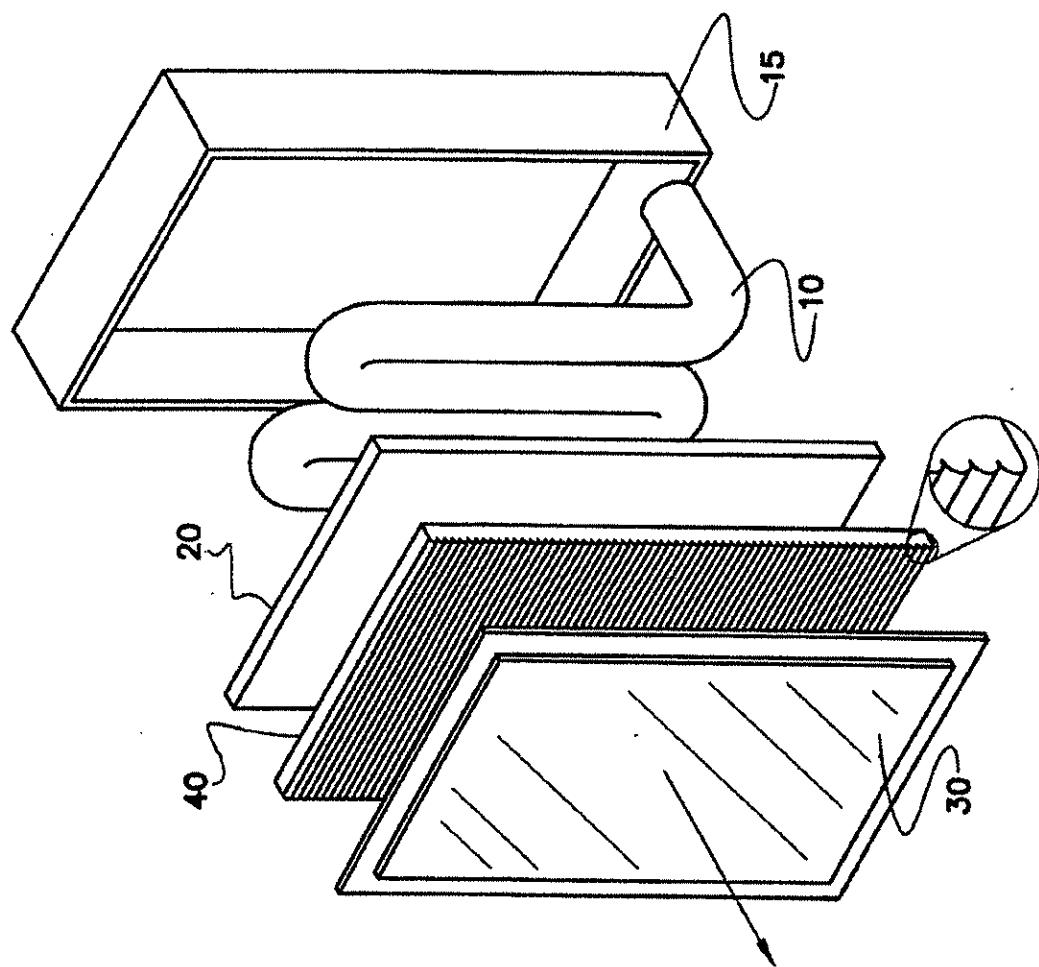
**U.S. Patent**

Jan. 18, 1994

Sheet 2 of 11

**5,280,371**

*Fig. 2*

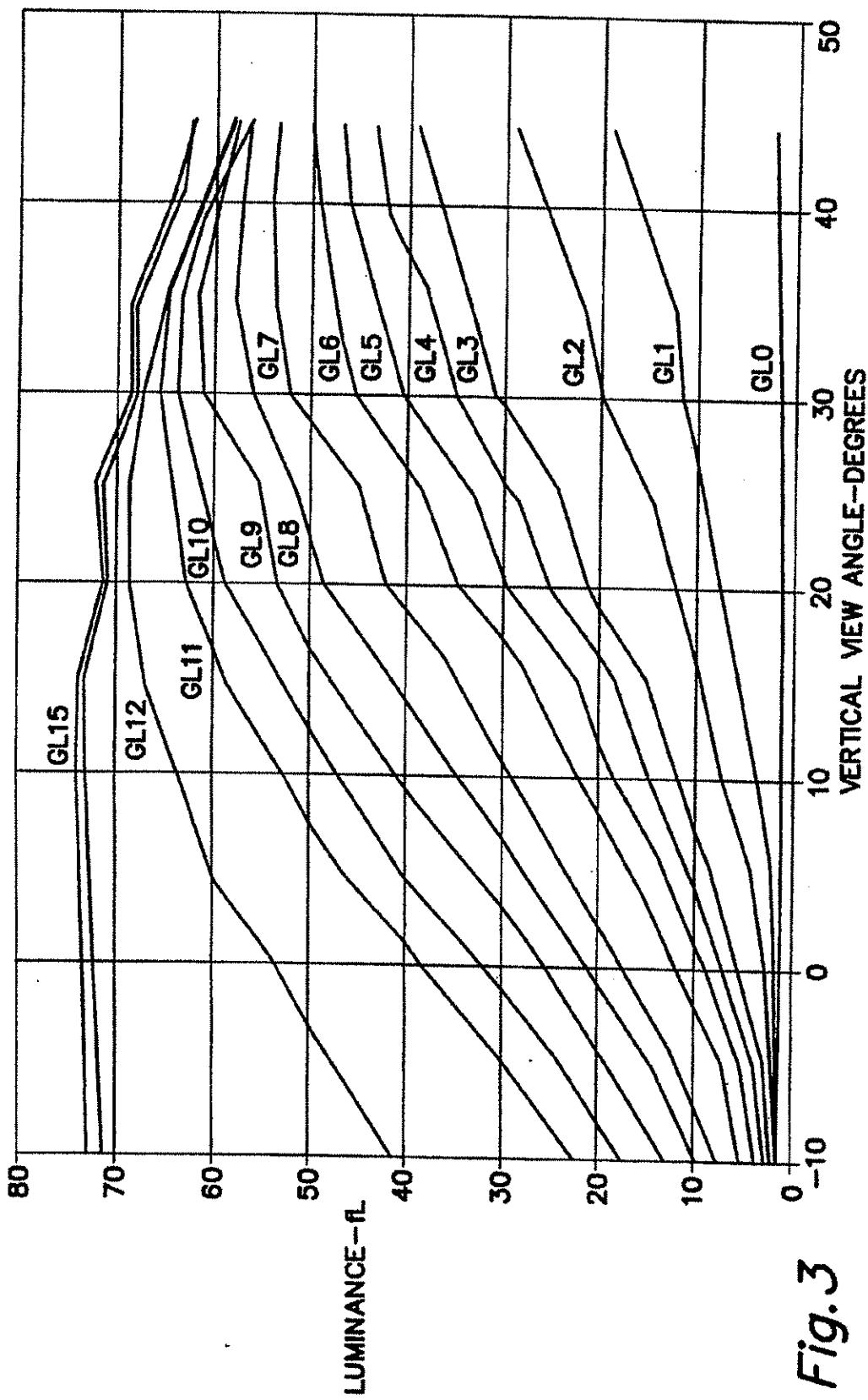


U.S. Patent

Jan. 18, 1994

Sheet 3 of 11

5,280,371



U.S. Patent

Jan. 18, 1994

Sheet 4 of 11

5,280,371

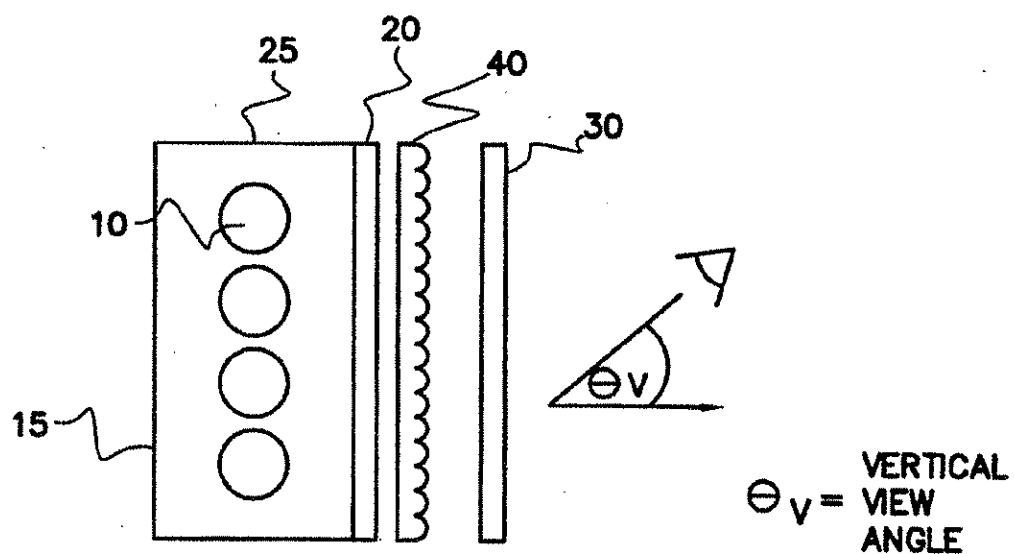


Fig. 4A

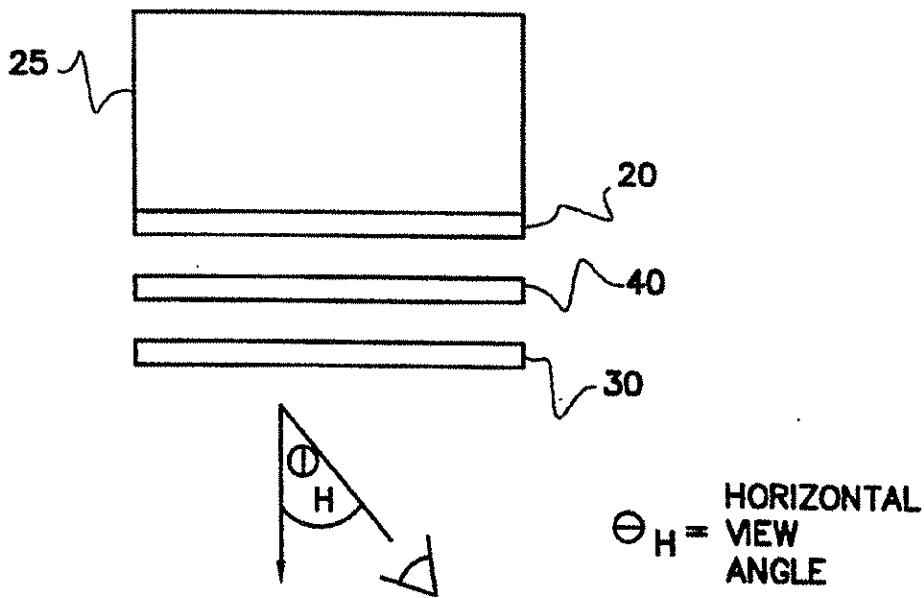


Fig. 4B

U.S. Patent

Jan. 18, 1994

Sheet 5 of 11

5,280,371

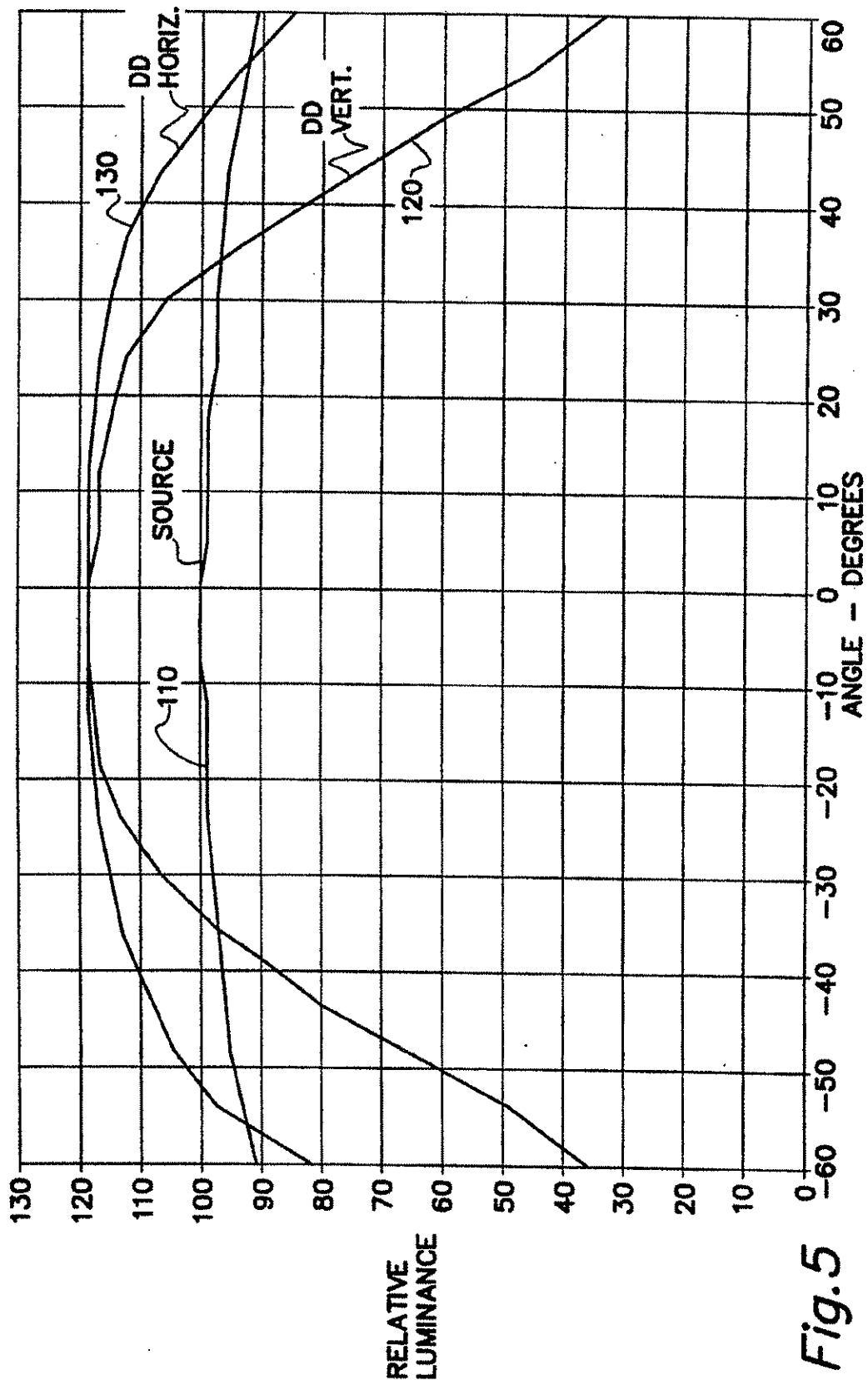


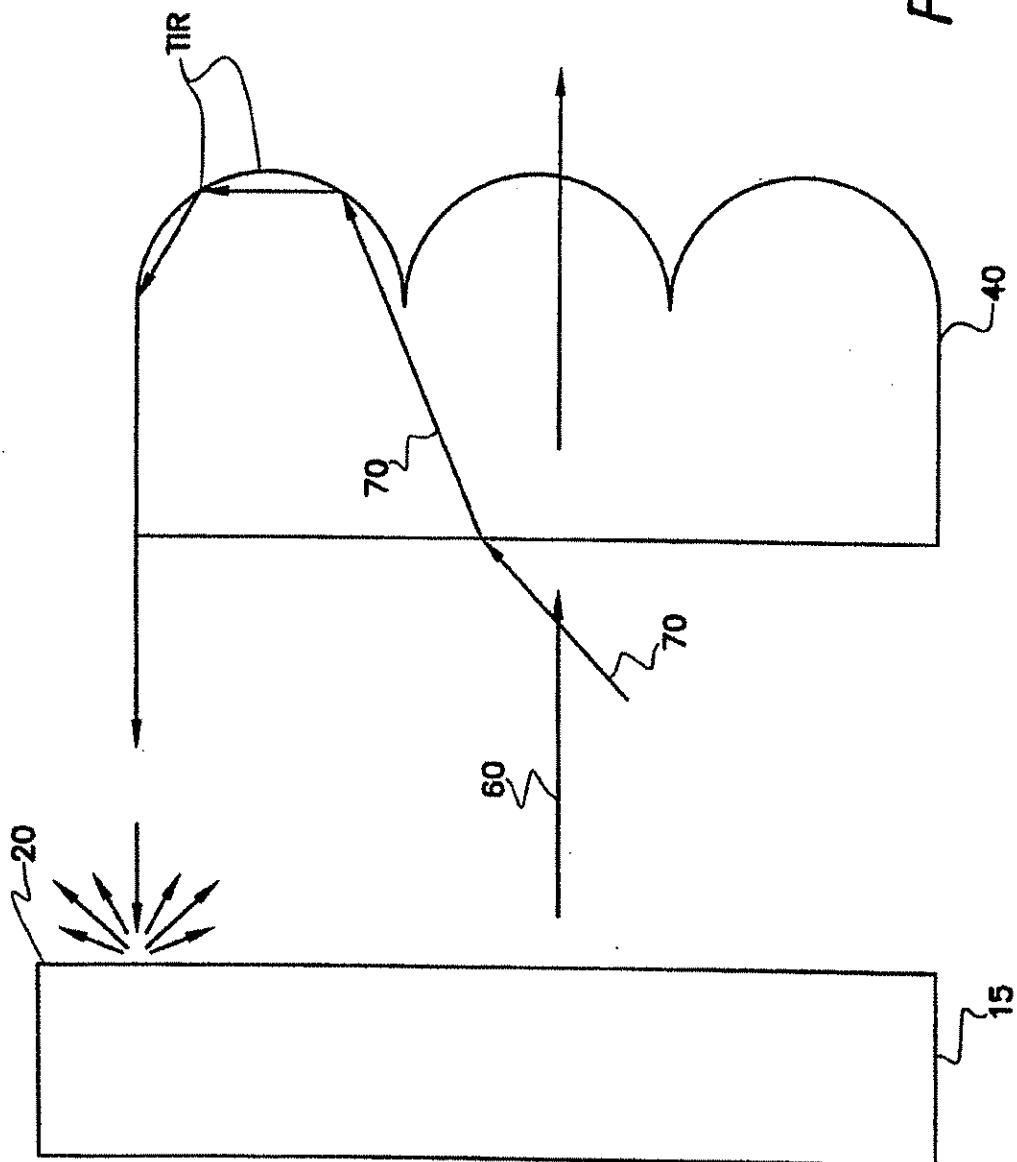
Fig. 5

U.S. Patent

Jan. 18, 1994

Sheet 6 of 11

5,280,371



U.S. Patent

Jan. 18, 1994

Sheet 7 of 11

5,280,371

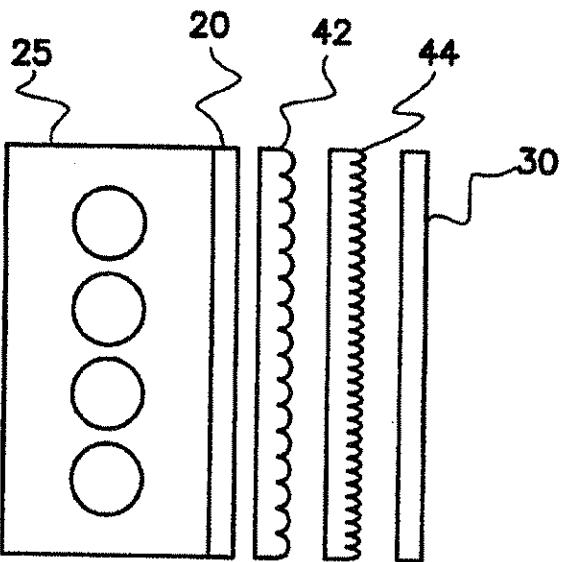


Fig. 7

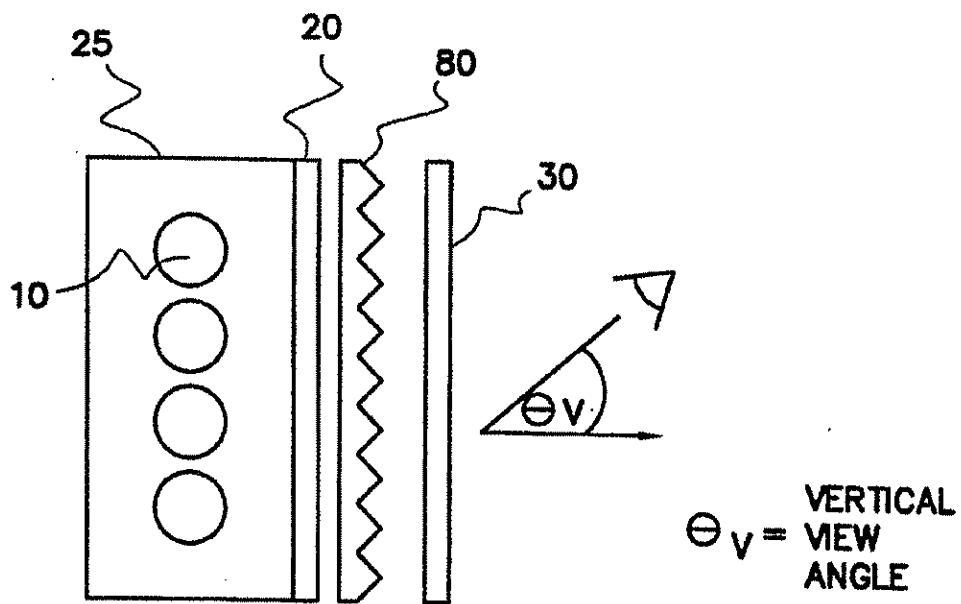


Fig. 10

U.S. Patent

Jan. 18, 1994

Sheet 8 of 11

5,280,371

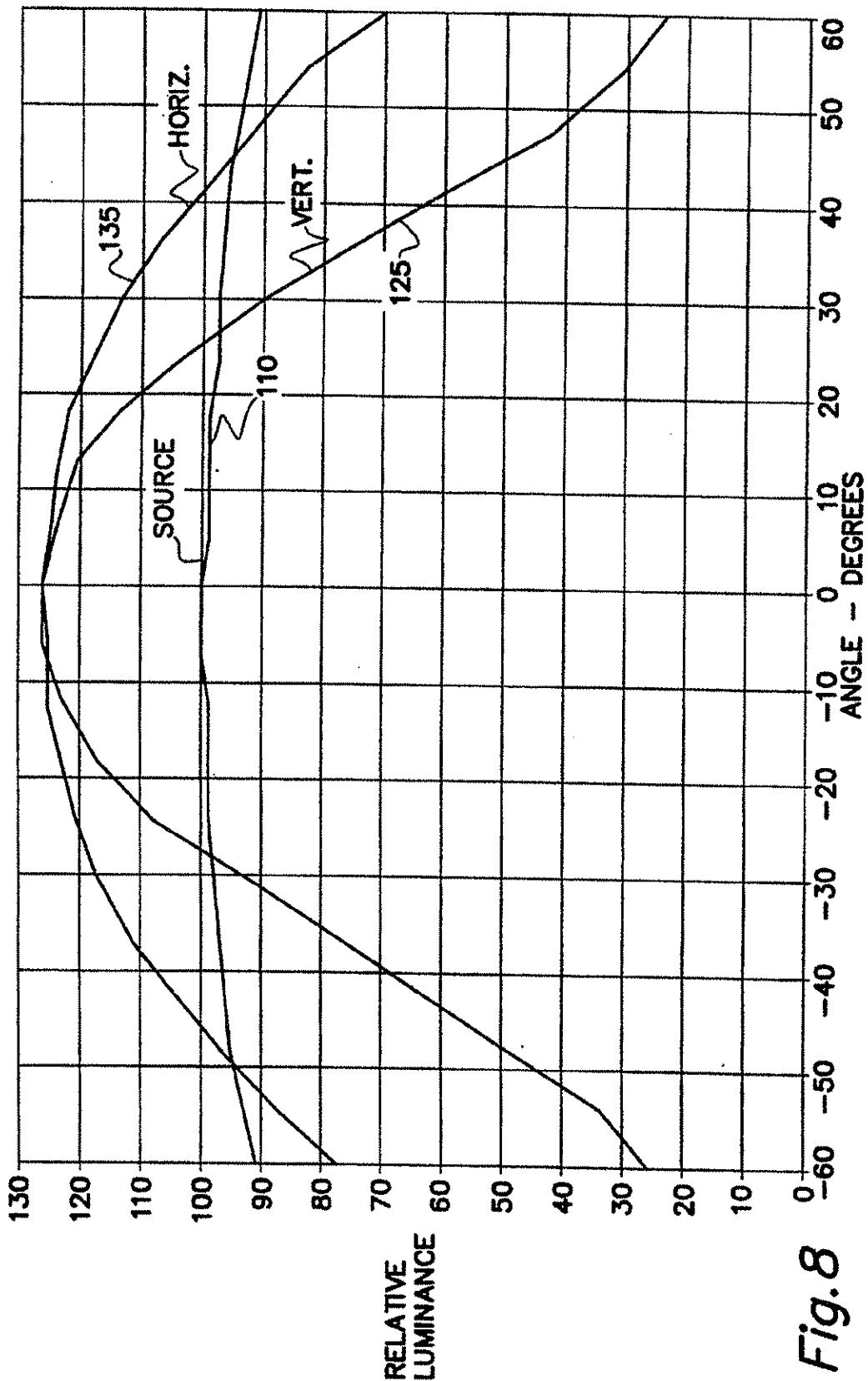


Fig. 8

U.S. Patent

Jan. 18, 1994

Sheet 9 of 11

5,280,371

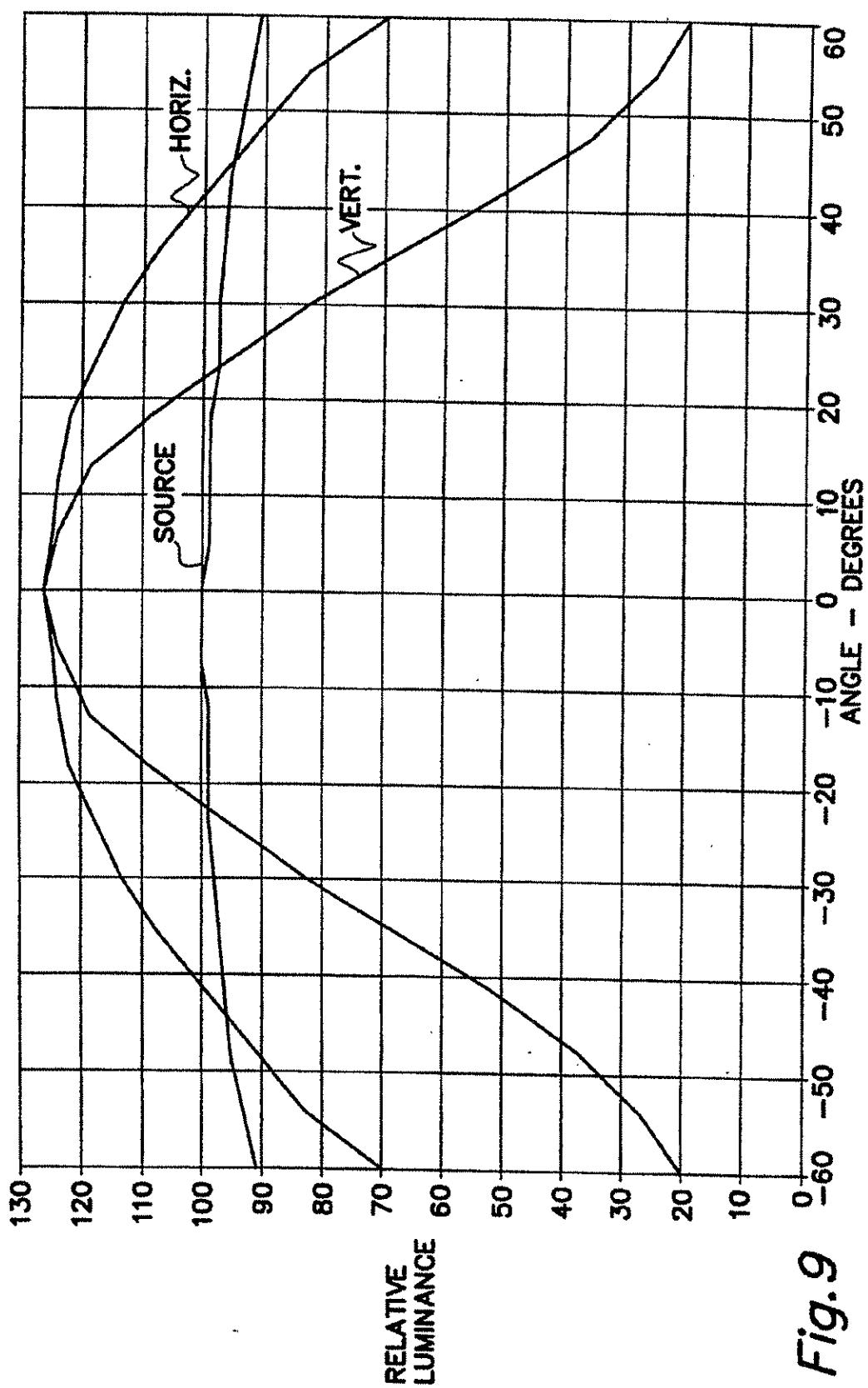


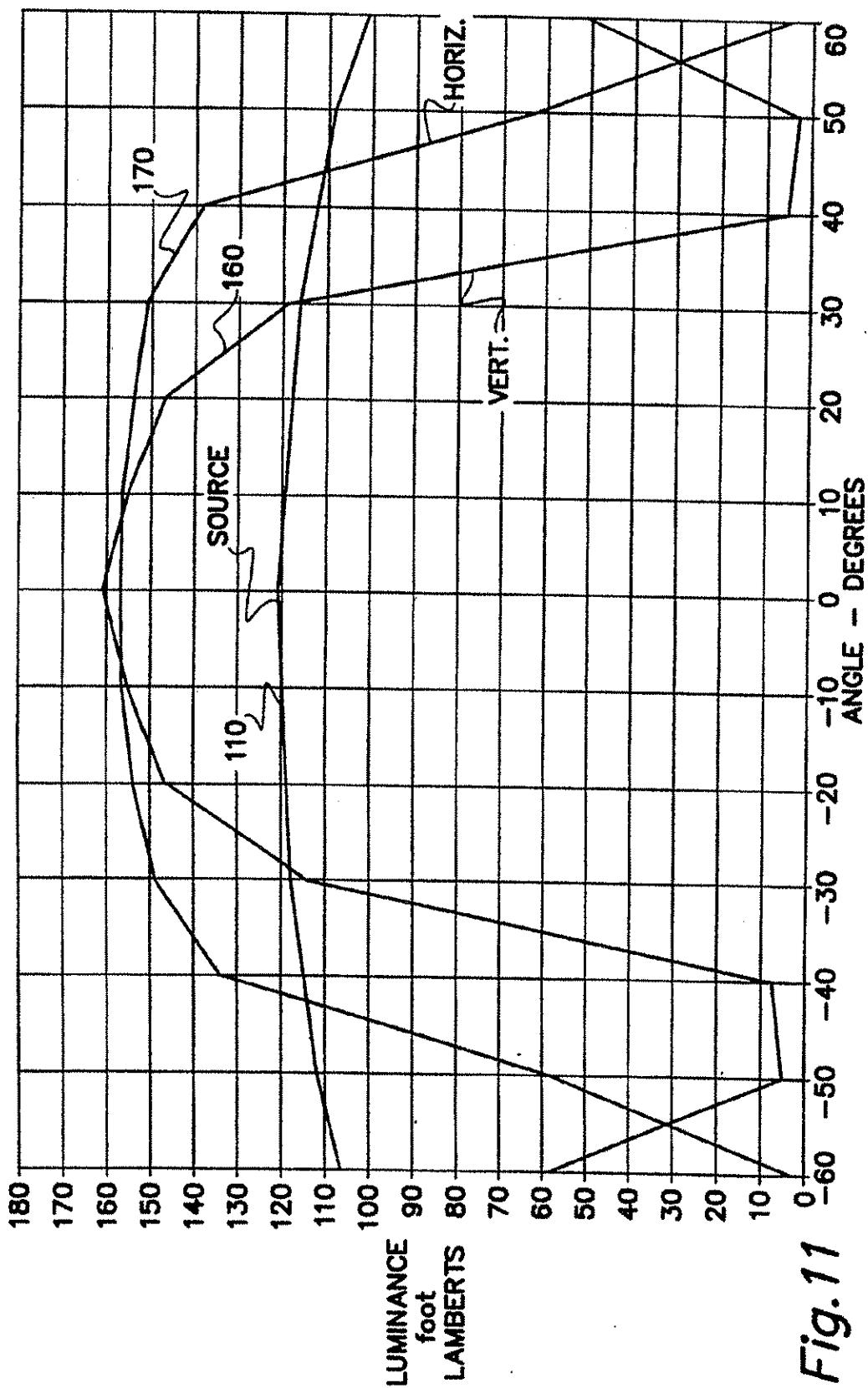
Fig. 9

**U.S. Patent**

Jan. 18, 1994

Sheet 10 of 11

**5,280,371**



*Fig. 11*

U.S. Patent

Jan. 18, 1994

Sheet 11 of 11

5,280,371

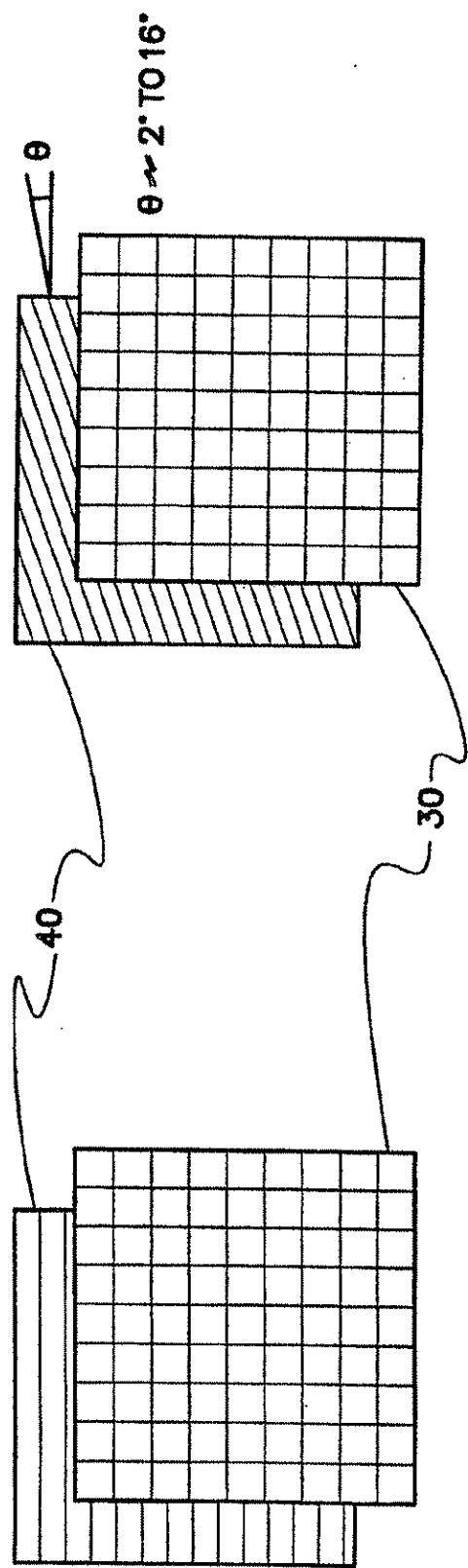


Fig. 12

5,280,371

1

2

**DIRECTIONAL DIFFUSER FOR A LIQUID CRYSTAL DISPLAY**

**BACKGROUND OF THE INVENTION**

This invention relates in general to flat panel liquid crystal displays and, more particularly, to a liquid crystal display (LCD) having a directional diffuser to provide a tailored variation of luminance with viewing angle.

There are commercially available liquid crystal displays for use in various applications, including for example aircraft cockpit displays. However, a typical characteristic of the liquid crystal panel used therein is a wide variation of the light transmission of the liquid crystal panel with viewing angle, especially the vertical viewing angle. This results in gray-scale errors and off-state errors with viewing angle. That is to say, the brightness of certain areas of the display when viewed at angles above or below a vertical viewing angle normal to the display surface, may be substantially different than the brightness of those areas when viewed at an angle normal to the display surface. This variation of brightness or luminance with viewing angle is generally undesirable and particularly undesirable in those cases where the information being displayed on the liquid crystal display is critical to an operation such as controlling or navigating an aircraft.

In addition, a typical diffuser used to provide a light source for backlighting a typical liquid crystal display ordinarily provides a constant luminance with viewing angle and therefore provides the same amount of energy for any given viewing angle of the display. In certain applications, such as for example an aircraft cockpit, the typical vertical viewing angle is fixed within a relatively narrow range and it would therefore be desirable to concentrate a higher percentage of the energy from the light source within a particular range of viewing angles.

It would therefore be desirable to provide a directional diffuser for use with a liquid crystal display to provide a tailored variation of luminance with viewing angle while also providing a concentration of the light energy from the light source within a predetermined range of viewing angles.

**SUMMARY OF THE INVENTION**

It is therefore an object of the present invention to provide a directional diffuser element for a liquid crystal display to provide a tailored variation of luminance with viewing angle.

It is a further object of the present invention to provide a liquid crystal display having less variation of intermediate gray-level luminance with viewing angle.

It is still further an object of the present invention to provide a liquid crystal display combining the above features to provide a higher concentration of light energy, and therefore increased luminance, within a particular range of viewing angles thereby providing a more efficient use of light energy available from a light source.

The foregoing and other objects are achieved in the present invention wherein there is provided a liquid crystal display apparatus comprising a light source, a liquid crystal planar array of pixels for creating an image by controlling the amount of light allowed to pass through each of the pixels, and one or more directional diffuser lens arrays disposed between the light

source and the liquid crystal array for providing a tailored variation of luminance from the liquid crystal display as a function of vertical viewing angle.

**5 BRIEF DESCRIPTION OF THE DRAWINGS**

The above mentioned and other features and objects of the present invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of alternative embodiments of the invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an exploded view of a typical prior art backlit liquid crystal display;

FIG. 2 is an exploded view of the liquid crystal display of the present invention, having a directional diffuser lens array;

FIG. 3 illustrates a typical prior art LCD gray-level response showing the variation of luminance with vertical viewing angle;

FIGS. 4A and 4B show cross sectional side and top views of a typical assembly including the lens array of the present invention;

FIG. 5 illustrates the variation of luminance with viewing angle for a light source alone and a light source combined with a single lens array;

FIG. 6 illustrates the path of various light rays when striking the lens array at various angles;

FIG. 7 is a cross sectional view of a preferred embodiment of the present invention with two lens arrays;

FIG. 8 illustrates the variation of luminance with viewing angle for the dual lens array configuration;

FIG. 9 illustrates the variation of luminance with viewing angle for a triple lens array configuration;

FIG. 10 is a cross sectional view of a configuration utilizing a triangular shaped lens array;

FIG. 11 illustrates the variation of luminance with viewing angle for the triangular shaped lens array; and

FIG. 12 shows the angular rotation of the lens array with respect to the LCD matrix array to eliminate residual moire effects.

**DESCRIPTION OF A PREFERRED EMBODIMENT**

Referring now to FIG. 1 there is shown a cross section of a typical prior art liquid crystal display apparatus including backlight array 25 comprising lamp 10, rear reflecting surface 15 and lambertian diffuser 20. The backlight array provides a source of light which impinges on liquid crystal panel 30 comprised of a number of individual liquid crystal elements which are alternately energized in order to form a desired pattern or image for viewing from the front of the liquid crystal display.

While this typical prior art liquid crystal panel may be adequate for certain applications where the normal viewing angle is more or less at an angle normal to the display surface, this display is not optimum for applications wherein the typical viewing angle is other than at an angle normal to the display surface. This prior art display exhibits a relatively wide variation of light transmission with viewing angle, especially the vertical viewing angle. As illustrated in FIG. 3 this variation also changes with the level of illumination for various gray-levels or intermediate intensities for a given display.

As can be seen in the curves of FIG. 3, the luminance emitted from the lower gray-levels of the LCD system increases significantly with increasing vertical viewing angle. This variation presents an undesirably large luminance increase with angle when the information being presented is low-level luminance information, such as for avionics applications including weather radar or attitude director indicator presentations. As a pilot viewing the display moves his vertical perspective, or his viewing angle, higher above a normal angle to the display (larger vertical viewing angles), he observes a low luminance field increase significantly in luminance, thereby causing confusion in interpretation of critical display information.

In addition, the lambertian diffuser of the typical prior art display, element 20 of FIG. 1, provides for a nearly equal luminance in all angular viewing directions. In most applications a 180° field of view in both horizontal and vertical directions is not required. It would therefore be more energy efficient if a substantial portion of the light energy could be redirected so as to be concentrated in the viewing angles of interest for a particular application.

The apparatus of the present invention includes the backlight array and liquid crystal of the prior art as shown in FIG. 1 with the addition of a lens array 40 inserted between the lambertian diffuser 20 of the prior art and liquid crystal display panel 30, as shown in FIG. 2. It was found that by inserting a directional diffuser consisting of a cylindrical lens array 40 between the lambertian diffuser and the liquid crystal panel that both of the desired effects could be accomplished. That is, the overall light energy is concentrated within a desired range of viewing angles and the variation of luminance with viewing angle is tailored to offset that which is obtained through the liquid crystal display alone.

For example, FIG. 5 illustrates that with the insertion of lens array 40 as shown in FIGS. 4A and 4B, the overall luminance has increased approximately 20 percent within a range from -20° to +20° viewing angle and the desired decrease in luminance with increased vertical viewing angle is obtained between approximately +10° and +35° of vertical viewing angle. Curve 110 of FIG. 5 illustrates the variation of luminance with viewing angle for the lambertian light source only, in both the horizontal and vertical angles while curves 120 and 130 respectively represent a variation of luminance with vertical and horizontal viewing angles for the backlight including lens array 40.

The effect which results from the insertion of the cylindrical lens array is explained by reference to FIG. 6 wherein there are shown light rays from the lambertian (having uniform luminance with angle) source diffuser impinging on the lens array from various angles. An air gap must be present at the interface of the lambertian diffuser and the lens array. The normal 4 percent loss per surface due to fresnel reflections is not incurred, because the surface reflections are returned to the diffuser and reflected again.

Those rays that are normal to the source diffuser but less than the critical angle within the lens array are passed through the lens array materially unobstructed, except for a small amount of surface reflection. Rays which enter at oblique angles and are greater than the critical angle of the lens array undergo total internal reflection at the inside of the lens surface as illustrated by ray tracing 70. These rays are reflected with no loss due to the total internal reflection effect around the lens

periphery. They exit the rear of the lens array and return to the source diffuser where they undergo a secondary diffuse reflection from the source diffuser.

However, because the source diffuser is not totally reflective, some of the returned rays are transmitted through the diffuser and are then reflected from the backlight enclosure surface 15 of FIG. 4A. Some fraction of these rays are reflected internally to exit the diffuser again. These reflected rays again have a lambertian distribution at the surface of lambertian diffuser 20. It is apparent from this interaction between the lens array and the backlight that rays which impinge close to the normal tend to be intensified while those rays which impinge at oblique angles undergo total internal reflection and are returned to the diffuser and diminished somewhat from this statistical process.

However, the roll off or variation with vertical viewing angle for this single directional diffuser cylindrical lens array was not sufficient to offset the effects of the liquid crystal display, and there were significant moire patterns caused by the interference between the lens array and the display panel wherein the lens array contained 142 lenses per inch and the display panel matrix had a spatial frequency resolution of 172 dots or pixels per inch.

For the desired specific implementation it was discovered that the adverse interaction producing moire patterns could be eliminated by including a second lens array with a different number of lenses per inch. The combination of the dual lenses increased the desired reduction in luminance with increased viewing angle, and in addition reduced or eliminated the moire patterns with the selection of an appropriate pitch, or number of lenses per inch, for the two lenses in question.

As illustrated in FIG. 7, one of the lens arrays 42 was selected to have a relatively coarse pitch with respect to that of the liquid crystal display and the second lens array 44 was selected to have a relatively fine pitch with respect to that of liquid crystal display. FIG. 8 illustrates again the relatively flat response of the lambertian source diffuser alone curve 110, and the increased roll off with vertical viewing angle of curve 125 as well as the corresponding variation of luminance with horizontal viewing angle as illustrated by curve 135 for the dual lens array of FIG. 8.

In general it was discovered that the addition of additional lens arrays caused a steeper or more rapid variation of the change in luminance with vertical viewing angle, which was desirable, but the corresponding change in luminance with variations in horizontal viewing angle also became steeper, which was not desirable for the particular application in question. For the particular application in question the preferred embodiment included two lens arrays in series which provided the best tradeoff of decrease in luminance with variation of vertical viewing angle, while not adversely affecting the variation in luminance with horizontal viewing angle.

In addition, since moire effects result when both of the lens arrays have the same spatial frequency, the rear array 42 should have a coarse resolution or low spatial frequency while the front lens array 44 should have a fine resolution or high spatial frequency. The lens arrays and the panel spatial frequencies should be selected to avoid integral multiples of the other. Thus the fine lens array should be as high a spatial frequency as is practical and should be a non integral multiple of the panel frequency. According to these guidelines the fine

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array frequency becomes approximately 2.5 times the display spatial frequency and the coarse array frequency should be approximately the fine array frequency divided by 3.5, 4.5, 5.5 or as required for the most convenient fabrication.

It was also discovered that the maximum increase in luminance was obtained using a triangular lens array having an included angle of 90° as illustrated in FIG. 10. This configuration resulted in a variation of luminance with vertical and horizontal viewing angles which was quite steep as illustrated by curves 160 and 170 of FIG. 11. Other lens array shapes may be selected as desired to obtain the required concentration of luminance and variation of luminance with vertical and horizontal viewing angle for a particular application.

Even though the spatial frequencies of the directional diffuser lens array and LCD panel have been selected to be greatly different and non-integer multiples, some visual banding effects or moire pattern effects may still be apparent to the viewer. This is especially true at off-axis viewing conditions. This residual moire can be removed by rotating the lens array 40 with the respect to the LCD array 30, as illustrated in FIG. 12. This rotation of the lens array by a few degrees (Typically 2 to 16 degrees) from the horizontal axis causes a small change in the effective spatial frequency difference of the two arrays and thereby eliminates the residual moire.

In addition to the angular redistribution of the light from the directional diffuser, the lens array also provides an additional diffusing effect, especially for any step variations in luminance that are parallel to (or nearly parallel to within a few degrees) the axis of the lens array. This allows the reduction of the thickness or optical density of the conventional diffuser while still achieving the same system luminance uniformity and masking of undesired spatial artifacts from the light source, but with higher luminance at the output.

While there have been described above the principals of invention in conjunction with several specific embodiments, it is to be clearly understood that these descriptions are made only by way of example and not as a limitation to the scope of the invention.

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We claim:

1. A display apparatus comprising:  
a light source;  
a liquid crystal panel mounted adjacent to said light source for receiving light from said light source; and  
first and second lens arrays, each having a plurality of individual lenslets, disposed between said light source and said liquid crystal panel for providing a predetermined variation with viewing angle of light transmission from said light source through said lens arrays and said liquid crystal panel, wherein said liquid crystal panel comprised a plurality of pixels arranged in rows and columns, and wherein the number of rows of pixels per unit height, or pitch, of the liquid crystal panel is a first value; the number of lenslets per unit height, or pitch, of said first lens array is a second value which is less than said first value; and the number of lenslets per unit height, or pitch, of said second lens array is a third value which is greater than said first value.

2. A display apparatus in accordance with claim 1 wherein said third value is a non-integral multiple of said first value and is also a non-integral multiple of said second value.

3. A display apparatus comprising:  
a light source;  
a liquid crystal panel mounted adjacent to said light source for receiving light from said light source; and  
first and second lens arrays, each having a plurality of individual lenslets, disposed between said light source and said liquid crystal panel for providing a predetermined variation with viewing angle of light transmission from said light source through said lens arrays and said liquid crystal panel, wherein at least one of said first and second lens arrays is rotated about an axis perpendicular to said liquid crystal panel in order to provide a slight misalignment between said lenslets and said liquid crystal panel.

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IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

HONEYWELL INTERNATIONAL INC.	)	
and HONEYWELL INTELLECTUAL	)	
PROPERTIES INC.,	)	
	)	
Plaintiffs,	)	
	)	C.A. No. 04-1338-KAJ
v.	)	(Consolidated)
	)	
APPLE COMPUTER, INC., et al.,	)	
	)	
Defendants.	)	
	)	
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HONEYWELL INTERNATIONAL INC.,	)	
et al.,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	C.A. No. 04-1337-KAJ
	)	
AUDIOVOX CORPORATION, et al.,	)	
	)	
Defendants.	)	
	)	
<hr/>		
OPTREX AMERICA, INC.,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. 04-1536-KAJ
	)	
HONEYWELL INTERNATIONAL INC.,	)	
et al.,	)	
	)	
Defendants.	)	
	)	
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**STIPULATED PROTECTIVE ORDER**

Whereas pretrial discovery in this action will necessarily involve the disclosure of trade secrets or confidential research, development, product or commercial information by the undersigned parties and by other non-parties from whom discovery may be sought; and

Whereas the undersigned parties wish to establish rules and procedures governing the treatment of such information, and accordingly have conferred in good faith with respect to the terms of this Protective Order pursuant to Fed. R. Civ. P. 26(c);

IT IS HEREBY STIPULATED AND AGREED BY AND AMONG THE  
UNDERSIGNED PARTIES AS FOLLOWS:

**1. Scope of Protection.**

1.1 This Protective Order shall govern any record of information produced in this action and designated pursuant to ¶ 2 below, including all designated deposition testimony, all designated testimony taken at a hearing or other proceeding, interrogatory answers, documents and other discovery materials, whether produced informally or in response to interrogatories, requests for admissions, requests for production of documents, or other formal method of discovery.

1.2 This Protective Order shall also govern any designated record of information produced in this action pursuant to required disclosures under any federal procedural rule or any District of Delaware local rule, and any supplementary disclosures thereto.

1.3 This Protective Order shall apply to the undersigned parties and to any non-party from whom discovery may be sought and who produces confidential information (as defined below) (hereinafter, collectively, referred to as a "party" or the "parties").

**2. Designation**

2.1 Each party shall have the right to designate as confidential and subject to this Protective Order any information produced by it in this action which contains, reflects, or otherwise discloses confidential technical, business, or financial information

("CONFIDENTIAL information"). This designation shall be made by stamping or otherwise labeling each page or thing containing confidential information with the legend CONFIDENTIAL prior to its production or, if inadvertently produced without such legend, by furnishing written notice to the receiving party that the information shall be considered CONFIDENTIAL under this Protective Order. The parties will use reasonable care to avoid designating any documents or information CONFIDENTIAL that are generally available to the public.

2.2 Each party shall have the right to designate as restricted to review by those categories of individuals identified in ¶ 4.2 below and subject to this Protective Order any information produced in this action which contains, reflects, or otherwise discloses: (1) trade secrets; (2) research and development or other highly sensitive technical information; or (3) highly sensitive business-related financial information (collectively, "CONFIDENTIAL—ATTORNEYS' EYES ONLY information"). This designation shall be made by stamping or otherwise labeling each page or thing containing confidential information with the legend CONFIDENTIAL—ATTORNEYS' EYES ONLY prior to its production or, if inadvertently produced without such legend, by furnishing written notice to the receiving party that the information shall be considered CONFIDENTIAL—ATTORNEYS' EYES ONLY under this Protective Order. To the extent that material is marked CONFIDENTIAL—ATTORNEYS' EYES ONLY, such material shall be revealed to or used by limited categories of individuals, as provided for in ¶ 4.2 below, and shall not be communicated in any manner, either directly or indirectly, to any person or entity not permitted disclosure pursuant to this Protective Order. Any copies of such material, abstracts, summaries, or information derived therefrom, and any notes or other records regarding the contents thereof, shall also be deemed

CONFIDENTIAL—ATTORNEYS' EYES ONLY, and the same terms regarding confidentiality of these materials shall apply as apply to the originals. The parties will use reasonable care to avoid designating any documents or information CONFIDENTIAL—ATTORNEYS' EYES ONLY for which the designating party does not have a good faith belief that the documents or information satisfy the criteria set forth in this paragraph.

2.3 Each party shall have the right to designate as restricted to review by those categories of individuals identified in ¶ 4.3 below and subject to this Protective Order any information produced in this action which contains, reflects, or otherwise discloses confidential information that comprises or contains sensitive information which is deemed by the producing party as inappropriate for review by in house personnel of non-affiliated companies except as otherwise provided herein, including: (1) trade secrets; (2) research and development or other highly sensitive technical information; or (3) highly sensitive business-related financial information (collectively, "HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY"). This designation shall be made by stamping or otherwise labeling each page or thing containing confidential information with the legend HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY prior to its production or, if inadvertently produced without such legend, by furnishing written notice to the receiving party that the information shall be considered HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY under this Protective Order. To the extent that material is marked HIGHLY CONFIDENTIAL—OUTSIDE COUNSEL'S EYES ONLY, such material shall be revealed to or used by limited categories of individuals, as provided for in ¶ 4.3 below, and shall not be communicated in any manner, either directly or indirectly, to any person or entity not permitted disclosure pursuant to this Protective Order. Any copies of

such material, abstracts, summaries, or information derived therefrom, and any notes or other records regarding the contents thereof, shall also be deemed HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY, and the same terms regarding confidentiality of these materials shall apply as apply to the originals. Use of this highly restrictive designation is limited to information of the highest sensitivity. The parties will use reasonable care to avoid designating any documents or information HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY for which the designating party does not have a good faith belief that the documents or information satisfy the criteria set forth in this paragraph.

2.4 CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY, or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information shall be used only for purposes directly related to this action, and for no other purpose whatsoever, except by consent of the producing party or by order of the Court.

2.5 To the extent that any party has, prior to the date that this Order is entered, produced to the other side materials that the producing party has marked with any confidentiality designation, all such materials shall be considered to have been designated under this Order as HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY unless otherwise agreed by the producing party.

**3. Limit On Use And Disclosure Of Designated Information.**

3.1 Each party and all persons bound by the terms of this Protective Order shall use any information or document governed by this Protective Order only in connection with the prosecution or defense of this action, except by consent of the producing party or by order of the Court. No party or other person shall disclose or release to any person not authorized under this Protective Order any information or document governed by this Protective Order

for any purpose, or to any person authorized under this Protective Order for any other purpose.

3.2 It is, however, understood that counsel for a party may give advice and opinions to his or her client based on his or her evaluation of designated confidential information received by the party, provided that such rendering of advice and opinions shall not reveal the content of such information except by prior written agreement with counsel for the producing party.

3.3 The attorneys of record for the parties and other persons receiving documents or information governed by this Protective Order shall exercise reasonable care to ensure that said documents or information governed by this Protective Order are: (a) used only for the purposes specified herein; and (b) disclosed only to authorized persons.

**4. Disclosures Of Confidential, Confidential—Attorney's Eyes Only, and Highly Confidential—Outside Attorneys' Eyes Only Material.**

4.1 Absent the consent of the producing party, documents or information designated CONFIDENTIAL shall be disclosed by the recipient thereof only to:

- (a) the outside counsel of record and their staffs who are actively involved in this action and such additional law firms that become law firms of record for a party after the effective date of this Protective Order.
- (b) the Court and Court personnel, as provided in ¶ 12 below;
- (c) consultants, experts, or translators and their staffs retained by a party or its attorneys for purposes of this action, who are agreed upon by the parties pursuant to ¶ 6 below, who are not employees or otherwise affiliated with any of the parties (except persons scheduled

to be deposed by a party pursuant to Fed. R. Civ. P. 30(b)(6)), and who first agree to be bound by the terms of this Protective Order;

(d) court reporters employed in connection with this action;

(e) outside copying and computer services necessary for document handling,

and other litigation support personnel (e.g., graphic designers and animators); and

(f) up to four (4) in-house counsel, legal or intellectual property staff members regularly employed by a party or the party's related corporate affiliate and responsible for assisting such party in connection with this action (hereinafter collectively with in-house counsel "In-house Counsel") or other designated employees of a party or the party's related corporate affiliate and responsible for assisting such party in connection with this action, provided that each such individual must first agree to be bound by the terms of this Protective Order. If the receiving party has less than four (4) In-house Counsel, the receiving party may assign designated employees of the party or employees of the party's related corporate affiliate who are responsible for assisting the receiving party in this action and agree to be bound by the terms of this protective order, who shall be deemed to be In-house Counsel for the purposes of this Protective Order, to have access to CONFIDENTIAL—ATTORNEYS' EYES ONLY documents or information of the Honeywell parties, but not of the non-Honeywell parties, provided that the total number of actual and deemed In-house Counsel allowed access to CONFIDENTIAL—ATTORNEYS' EYES ONLY documents or information is not more than four (4).

4.2 Absent the consent of the producing party, documents or information designated CONFIDENTIAL—ATTORNEYS' EYES ONLY may be disclosed by the recipient thereof only to those categories of individuals listed in ¶¶ 4.1(a) - 4.1(e) above

subject to the restrictions therein; provided, however, documents or information designated CONFIDENTIAL—ATTORNEYS' EYES ONLY by a non-Honeywell party may be disclosed by the Honeywell parties to their In-house Counsel, and documents or information designated CONFIDENTIAL-ATTORNEY'S EYES ONLY by the Honeywell parties may be disclosed by a non-Honeywell party to its actual and deemed In-house Counsel.

4.3 Absent the consent of the producing party, documents or information designated HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY may be disclosed by the recipient thereof only to those categories of individuals listed in ¶¶ 4.1(a) - 4.1(e) above subject to the restrictions therein.

**5. Redaction.**

Counsel for a party producing documents may mask ("redact") material deemed exempt from discovery because it is protected from disclosure under the attorney-client privilege or work product immunity afforded by Fed. R. Civ. P. 26(b). However, any document from which material is masked on this ground must identify in the masked area that masking or redaction has occurred. The reason for any such masking must be stated on a log to be provided within a reasonable time after the production of the documents. Sufficient information regarding the masked material must be provided to the other party to enable it to evaluate the legitimacy of the asserted privilege or immunity. The parties reserve the right to pursue categories for redaction in addition to those identified above, by either consent of the parties or order of the Court, to be addressed on a case-by-case basis.

**6. Disclosure to Independent Consultants, Translators, Designated Employees, In-House Counsel, and Experts.**

6.1 If any party desires to disclose information designated by a producing party as CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY to any consultant, expert, or translator pursuant to ¶ 4.1(c) above or to any In-house Counsel or designated employee pursuant to ¶4.1(f), to the extent permitted by ¶ 4.2, it must first identify in writing to the attorneys for the producing party each such consultant, expert, translator, In-house Counsel, or designated employee. The writing shall be a facsimile, an email, or a first class mailing with facsimile or email confirmation. The attorneys for the producing party shall have ten (10) business days from receipt of such facsimile or email to object to disclosure of such information to any of the consultant, expert, translator, In-house Counsel, or designated employee so identified.

6.2 The identification of an expert or consultant shall include the full name and professional address and/or affiliation of the proposed expert or consultant, an up-to-date curriculum vitae, and a listing of at least all other present and prior employments or consultancies of the expert or consultant in the field of LCD display technologies. Additional information shall be provided upon request if available. The identification of an In-house Counsel shall include the full name and professional address of the In-house Counsel, an indication of whether such In-house Counsel performs patent prosecution in his/her employment. The identification of a designated employee shall identify the full name, professional address, position and job description of the designated employee. The identification of a translator shall include the full name, professional address of the proposed translator, and a listing of other present and prior employments in this case. The parties shall

attempt to resolve any objections informally. If the objections cannot be resolved, the party objecting to the disclosure of CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information to the expert, consultant, translator, In-house Counsel, or designated employee may move the Court for an Order proscribing the disclosure. Failure by the objecting party to move the Court for an Order within fifteen (15) days of its service of the original objection will be deemed a waiver of its objections. On any motion challenging the disclosure of such information to an expert, consultant, translator, In-house Counsel, or designated employee, the burden of proof shall lie with the party objecting to the disclosure to establish that the information should not be disclosed to the expert, consultant, translator, In-house Counsel, or designated employee. In the event objections are made and not resolved informally, disclosure of information to the expert, consultant, translator, In-house Counsel, or designated employee shall not be made except by the Order of the Court (or to any limited extent upon which the parties may agree).

#### **7. Agreement Of Confidentiality**

In no event shall any information designated CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY be disclosed to any person authorized pursuant to ¶ 4 above, other than (a) the Court and Court personnel, (b) the parties' attorneys identified in ¶ 4.1(a) and their authorized secretarial and legal assistant staffs, (c) court reporters, and (d) outside copying and computer services necessary for document handling, until such person has executed a written Confidentiality Undertaking (in the form set forth in Exhibit A hereto) acknowledging and

agreeing to be bound by the terms of this Protective Order. Copies of such Confidentiality Undertakings shall be promptly served on the producing party.

**8. Related Documents.**

Information designated CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY shall include:

(a) all documents, copies, extracts, and complete or partial summaries prepared from or containing such information; (b) portions of deposition transcripts and exhibits thereto which contain or reflect the content of any such documents, copies, extracts, or summaries; (c) portions of briefs, memoranda or any papers filed with the Court and exhibits thereto which contain or reflect the content of any such documents, copies, extracts, or summaries; (d) deposition testimony designated in accordance with ¶ 9 below; and (e) testimony taken at a hearing or other proceeding that is designated in accordance with ¶ 10 below.

**9. Designation of Deposition Transcripts.**

9.1 Deposition transcripts, or portions thereof, may be designated as subject to this Protective Order either (a) at the time of such deposition, in which case the transcript of the designated testimony shall be marked by the reporter with the appropriate legend (see ¶ 2 above) as the designating party may direct, or (b) within thirty (30) days following the receipt of the transcript of the deposition by providing written notice to the reporter and all counsel of record, in which case all counsel receiving such notice shall mark the copies or portions of the designated transcript in their possession or under their control as directed by the designating party.

9.2 All deposition transcripts not previously designated shall be deemed to be, and shall be treated as CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY until the

expiration of the period set forth in ¶ 9.1 above, and neither the transcript nor the content of the testimony shall be disclosed by a non-designating party to persons other than those persons named or approved according to ¶ 4 above.

9.3 The designating party shall have the right to exclude from a deposition, before the taking of testimony which the designating party designates CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY and subject to this Protective Order, all persons other than those persons previously qualified to receive such information pursuant to ¶ 4 above.

**10. Designation of Hearing Testimony or Argument.**

With respect to testimony elicited during hearings and other proceedings, whenever counsel for any party deems that any question or line of questioning calls for the disclosure of CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information, counsel may designate on the record at any time during the hearing that the disclosure is subject to confidentiality restrictions. Whenever matter designated CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY is to be discussed in a hearing or other proceeding, any party claiming such confidentiality may ask the Court to have excluded from the hearing or other proceeding any person who is not entitled under this Order to receive information so designated.

**11. Disclosure To Author Or Recipient.**

Notwithstanding any other provisions of this Order, nothing herein shall prohibit counsel or a party from disclosing a document containing information designated CONFIDENTIAL,

CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY to any person which the document clearly identifies as an author, addressee, or carbon copy recipient of such document, or to any current employee of the producing party who by their testimony indicates that they have access to the type of information sought to be disclosed. During deposition or trial testimony, counsel may disclose documents produced by a party to current employees and officers of the producing party who by their testimony indicates that they have access to the type of information sought to be disclosed. Regardless of confidentiality designations made pursuant to this Protective Order, if a document or testimony makes reference to the actual or alleged conduct or statements of a person who is a potential witness, counsel may discuss such conduct or statements with such witness without revealing any portion of the document or testimony other than that which specifically refers to such conduct or statement, and such discussion shall not constitute disclosure in violation of this Protective Order.

**12. Designation of Documents Under Seal.**

Any information designated CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY, if filed with the Court, shall be filed under seal and shall be made available only to the Court and to persons authorized by the terms of this Protective Order. A party filing any paper which reflects, contains or includes any CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information subject to this Protective Order shall file such paper in a sealed envelope, or other appropriately sealed container, which indicates the title of the action, the party filing the materials, the nature of the

materials filed, the appropriate legend (see ¶ 2 above), and a statement substantially in the following form:

**This envelope contains documents subject to a Protective Order of the Court. It should be opened only by the Court. Its contents should not be disclosed, revealed, or made public except by Order of the Court or written agreement of the parties.**

**13. Confidentiality Of A Party's Own Documents.**

No person may disclose, in public or private, any designated information of another party except as provided for in this Protective Order, but nothing herein shall affect the right of the designating party to disclose to its own officers, directors, employees, attorneys, consultants or experts, or to any other person, its own information. Such disclosure shall not waive the protections of this Protective Order and shall not entitle other parties or their attorneys to disclose such information in violation of it, unless by such disclosure of the designating party the information becomes public knowledge (see ¶ 16 below). Similarly, the Protective Order shall not preclude a party from showing its own information to its own officers, directors, employees, attorneys, consultants or experts, or to any other person, which information has been filed under seal by the opposing party.

**14. Other Protections.**

14.1 No person shall use any CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information, or information derived therefrom, for purposes other than the prosecution or defense of this action, including without limitation, for purposes of preparing, filing or prosecuting any patent application, continuation or divisional patent application, reissue patent application, or request for re-examination.

14.2 Any party may mark any document or thing containing CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information as an exhibit to a deposition, hearing, or other proceeding and examine any witness thereon qualified under the terms of this Protective Order to have access to such designated material. Any respective portion of a transcript of the deposition, hearing, or other proceeding discussing the exhibit shall have the same confidentiality designation as the exhibit. No separate notice is needed regarding the respective portion unless otherwise agreed upon at the deposition, hearing, or other proceeding.

**15. Challenge To Confidentiality.**

15.1 This Protective Order shall not preclude any party from seeking and obtaining, on an appropriate showing, such additional protection with respect to the confidentiality of documents or other discovery materials as that party may consider appropriate. Nor shall any party be precluded from: (a) claiming that any matter designated hereunder is not entitled to the protections of the Protective Order; (b) applying to the Court for an Order permitting the disclosure of use of information or documents otherwise prohibited by this Protective Order; or (c) applying for a further Order modifying this Protective Order in any respect. No party shall be obligated to challenge the propriety of any designation, and failure to do so shall not preclude a subsequent challenge to the propriety of such designation.

15.2 On any motion challenging the designation of any information, the burden of proof shall lie with the producing party to establish that the information is, in fact, CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information. If a party seeks

declassification or removal of particular items from a designation on the ground that such designation is not necessary to protect the interests of the party wishing the designated information, the following procedure shall be utilized:

a. the party seeking such declassification or removal shall give counsel of record for the other party written notice thereof specifying the designated information as to

which such removal is sought and the reasons for the request; and

b. if, after conferring, the parties cannot reach agreement concerning the matter, then the party requesting the declassification or removal of particular items may file and serve a motion for a further Order of this Court directing that the designation shall be so

removed.

**16. Prior Or Public Knowledge**

This Protective Order shall not apply to information that, prior to disclosure, is public knowledge, and the restrictions contained in this Protective Order shall not apply to information that is, or after disclosure becomes, public knowledge other than by an act or omission of the party to whom such disclosure is made, or that is legitimately and independently acquired from a source not subject to this Protective Order.

**17. Limitation Of Protective Order.**

This Protective Order is not intended to address discovery objections to produce, answer, or respond on the grounds of attorney-client privilege or work product doctrine, or to preclude any party from seeking further relief or protective orders from the Court as may be appropriate under the Federal Rules of Civil Procedure or other applicable rule.

**18. Other Proceedings.**

By entering this Protective Order and limiting the disclosure of information in this case, the Court does not intend to preclude another court from finding that information may be relevant and subject to disclosure in another case. Any person or party subject to this Order who may be subject to a motion to disclose another party's CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information pursuant to this Order shall promptly notify that party of the motion so that it may have an opportunity to appear and be heard on whether such information should be disclosed.

**19. Inadvertent Disclosure Of Work Product Or Privileged Information: Procedure And Waiver.**

19.1 If the producing party at any time notified the non-producing party in writing that it has inadvertently produced documents and/or things that are protected from disclosure under attorney-client privilege, work-product immunity, and/or any other applicable privilege or immunity from disclosure, the non-producing party shall return or destroy all physical and electronic copies of such documents and/or things to the producing party within five (5) business days of receipt of such notice and shall not further disclose or use such items, or information learned exclusively therefrom, for any purpose until further order of the Court. Upon being notified by the producing party pursuant to this section, counsel for the non-producing party shall use his or her best efforts to retrieve all copies of the documents or things at issue.

19.2 The return of any discovery item to the producing party shall not in any way preclude the non-producing party from moving the Court for a ruling that: (a) the document or

thing was never privileged or otherwise immune from disclosure; and/or (b) that any applicable privilege or immunity has been waived.

19.3 Inadvertent or unintentional disclosure of information subject to any privilege or immunity during the course of this litigation without proper designation shall not be deemed a waiver of a claim that disclosed information is in fact subject to a privilege or immunity if so designated within ten (10) business days after the producing party actually learns of the inadvertent or unintentional disclosure.

**20. Non-Party Material.**

The terms of this Protective Order, as well as the terms of any protective order that may be entered into between a discovering party and third party for the production of information to the discovering party, are applicable to CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY information provided by a non-party. Information provided by a non-party in connection with this action and designated CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY pursuant to the terms of this Protective Order shall be protected by the remedies and relief provided by this Protective Order.

**21. Return Of Designated Information.**

Within thirty (30) days of final termination of this action, unless otherwise agreed to in writing by an attorney of record for the designating party, each party shall assemble and return, or certify destruction of, all materials including both physical and electronic copies containing information designated CONFIDENTIAL, CONFIDENTIAL—ATTORNEYS' EYES ONLY or HIGHLY CONFIDENTIAL—OUTSIDE ATTORNEYS' EYES ONLY, including all copies,

extracts and summaries thereof, to the party from whom the designated material was obtained, except that (a) any documents or copies which contain, constitute, or reflect attorney's work product or attorney-client privilege communications, and (b) archive copies of pleadings, motion papers, deposition transcripts, correspondence, and written discovery responses may be retained by counsel.

**22. Waiver Or Termination Of Order.**

No part of the restrictions imposed by this Protective Order may be waived or terminated, except by written stipulation executed by counsel of record for each designating party, or by an Order of the Court. The restrictions provided for herein shall not terminate upon the conclusion of this action, but shall continue until further Order of the Court.

**23. Modification Of Order; Prior Agreements.**

This Protective Order may be modified, and any matter related to it may be resolved, by written stipulation of the parties without further Order of the Court. To the extent the terms of this Protective Order conflict with Local Rule 26.2 or with any agreements between the parties regarding the confidentiality of particular documents or information entered into before the date of this Protective Order, the terms of this Protective Order shall govern, except as to those documents and information produced or disclosed prior to the entry of this Protective Order, which documents and information shall continue to be governed by the terms of such prior agreements or by the provisions of Local Rule 26.2, as applicable.

Dated this \_\_\_\_\_ day of September 2006.

MORRIS, NICHOLS, ARSHT & TUNNELL FISH & RICHARDSON P.C.

By: /s/ Thomas C. Grimm

Thomas C. Grimm  
Leslie A. Polizoti  
1201 N. Market Street  
P.O. Box 1347  
Wilmington, DE 19899-1347  
(302) 658-9200  
[tgrimm@mnat.com](mailto:tgrimm@mnat.com)  
[lpolizoti@mnat.com](mailto:lpolizoti@mnat.com)

*Attorneys for Plaintiffs Honeywell International Inc. and Honeywell Intellectual Properties, Inc. in C.A. Nos. 04-1338 and 04-1536*

YOUNG CONAWAY STARGATT &  
TAYLOR LLP

By: /s/ John W. Shaw

John W. Shaw  
Monte T. Squire  
1000 West Street, 17<sup>th</sup> Floor  
Wilmington, DE 19899  
(302) 571-6600  
[jshaw@ycst.com](mailto:jshaw@ycst.com)  
[msquire@ycst.com](mailto:msquire@ycst.com)

*Attorneys for Sony Corporation, Sony Corporation of America, ST Liquid Crystal Display and Quanta Display Inc.*

By: /s/ Thomas L. Halkowski

Thomas L. Halkowski  
919 N. Market Street  
Suite 1100  
P.O. Box 1114  
Wilmington, DE 19899-1114  
(302) 652-5070  
[halkowski@fr.com](mailto:halkowski@fr.com)

*Attorneys for Casio Computer Co., Ltd.*

RICHARDS LAYTON & FINGER

By: /s/ William J. Wade

William J. Wade  
One Rodney Square  
P. O. Box 551  
Wilmington, DE 19899  
(302) 651-7700  
[wade@rlf.com](mailto:wade@rlf.com)

*Attorneys for Arima Display Corporation*

YOUNG CONAWAY STARGATT &  
TAYLOR LLP

By: /s/ Karen L. Pascale

Karen L. Pascale  
The Brandywine Bldg.  
1000 West Street, 17<sup>th</sup> Floor  
Wilmington, DE 19899  
(302) 571-6600  
[kpascale@ycst.com](mailto:kpascale@ycst.com)

*Attorneys for Optrex America, Inc.*

POTTER ANDERSON & CORROON LLP

By: /s/ Philip A. Rovner

Philip A. Rovner  
Hercules Plaza  
P. O. Box 951  
Wilmington, DE 19899  
(302) 984-6000  
[provner@potteranderson.com](mailto:provner@potteranderson.com)

*Attorneys for Fuji Photo Film Co., Ltd. and  
Fuji Photo Film U.S.A., Inc.*

POTTER ANDERSON & CORROON LLP

BOUCHARD MARGULES &  
FRIEDLANDER, P.A.

By: /s/ Richard L. Horwitz

Richard L. Horwitz  
David E. Moore  
Hercules Plaza  
P.O. Box 951  
Wilmington, DE 19899  
(302) 984-6000  
[rhorwitz@potteranderson.com](mailto:rhorwitz@potteranderson.com)  
[dmoore@potteranderson.com](mailto:dmoore@potteranderson.com)

*Attorneys for BOE Hydis Technology Co., Ltd.,  
Hitachi Displays, Ltd., Toppoly  
Optoelectronics Corp., Koninklijke Philips  
Electronics NV, Philips Electronics North  
America Corp., Philips Consumer Electronics  
North America, Wintek Corp., Wintek Electro-  
Optics Corporation, Samsung SDI America,  
Inc. and Samsung SDI Co., Ltd.*

By: /s/ David Margules

David Margules  
John M. Seaman  
222 Delaware Avenue, Suite 1400  
Wilmington, DE 19801  
(302) 573-3500  
[dmargules@bmflaw.com](mailto:dmargules@bmflaw.com)  
[jseaman@bmflaw.com](mailto:jseaman@bmflaw.com)

*Attorneys for Citizen Watch Co., Ltd. and  
Citizen Displays Co., Ltd.*

SMITH KATZENSTEIN & FURLOW LLP

By: /s/ Robert J. Katzenstein

Robert J. Katzenstein  
Robert Karl Beste, III  
800 Delaware Avenue, 7<sup>th</sup> Floor  
P. O. Box 410  
Wilmington, DE 19899  
(302) 652-8400  
[rkatzenstein@skfdelaware.com](mailto:rkatzenstein@skfdelaware.com)  
[rkb@skfdelaware.com](mailto:rkb@skfdelaware.com)

*Attorneys for Seiko Epson Corporation and  
Sanyo Epson Imaging Devices*

ASHBY & GEDDES

By: /s/ Steven J. Balick

Steven J. Balick  
John G. Day  
222 Delaware Avenue  
P. O. Box 1150  
Wilmington, DE 19899  
(302) 654-1888  
[sbalick@ashby-geddes.com](mailto:sbalick@ashby-geddes.com)  
[jday@ashby-geddes.com](mailto:jday@ashby-geddes.com)

*Attorneys for Honeywell International Inc.  
and Honeywell Intellectual Properties, Inc. in  
C.A. 04-1337*

SO ORDERED:

Dated: Sept. 17, 2006

DUANE MORRIS LLP

By: /s/ Gary William Lipkin

Gary William Lipkin  
1100 N. Market Street  
Suite 1200  
Wilmington, DE 19801  
(302) 657-4903  
[gwlipkin@duanemorris.com](mailto:gwlipkin@duanemorris.com)

*Attorneys for Innolux Display Corporation*

  
United States District Court Judge

**EXHIBIT A**

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

)  
HONEYWELL INTERNATIONAL INC.; and )  
HONEYWELL INTELLECTUAL PROPERTIES )  
INC.; )  
Plaintiffs, ) Civil Action No. 04-1338 KAJ  
(Consolidated)  
v. )  
APPLE COMPUTER, INC., et al. )  
Defendants. )  
)

**CONFIDENTIALITY UNDERTAKING**

I certify that I have read the Stipulated Protective Order entered in the above-referenced action and that I fully understand the terms of that Order. By signing below, I recognize that I am bound by the terms of that Order, and I agree to comply with those terms in all respects. I hereby consent to the personal jurisdiction of the United States District Court, District of Delaware, for any proceedings involving the enforcement of that Order, and I waive any venue objection with respect to any such proceedings.

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Affiliation

\_\_\_\_\_  
Business Address

IN THE UNITED STATES DISTRICT COURT  
DISTRICT OF DELAWARE

**CERTIFICATE OF SERVICE**

I, hereby certify that, on October 1, 2007, the within document was electronically filed with the Clerk of the Court using CM-ECF which will send notification of such filing to the following; the document was served by E-mail on the following; and the document is available for viewing and downloading from CM-ECF:

Thomas C. Grimm, Esq.  
Leslie A. Polizoti, Esq.  
Morris, Nichols, Arsh & Tunnell  
1201 N. Market Street  
P.O. Box 1347  
Wilmington, DE 19899-1347  
[tgrimm@mnat.com](mailto:tgrimm@mnat.com)  
[lpolizoti@mnat.com](mailto:lpolizoti@mnat.com)

Karen L. Pascale, Esq.  
Young, Conaway, Stargatt & Taylor, LLP  
The Brandywine Bldg., 17<sup>th</sup> Fl.  
1000 West Street  
Wilmington, DE 19801  
[kpascale@ycst.com](mailto:kpascale@ycst.com)

Richard L. Horwitz, Esq.  
David E. Moore, Esq.  
Potter Anderson & Corroon LLP  
Hercules Plaza  
P.O. Box 951  
Wilmington, DE 19899  
[rhorwitz@potteranderson.com](mailto:rhorwitz@potteranderson.com)  
[dmoore@potteranderson.com](mailto:dmoore@potteranderson.com)

David J. Margules, Esq.  
John M. Seaman, Esq.  
Bouchard Margules & Friedlander, P.A.  
222 Delaware Avenue, Suite 1400  
Wilmington, DE 19801  
[dmargules@bmf-law.com](mailto:dmargules@bmf-law.com)  
[jseaman@bmf-law.com](mailto:jseaman@bmf-law.com)



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Philip A. Rovner (#3215)  
Potter Anderson & Corroon LLP  
Hercules Plaza  
P.O. Box 951  
Wilmington, DE 19899  
(302) 984-6000  
E-mail: [provner@potteranderson.com](mailto:provner@potteranderson.com)